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(Under Section 6 (1) (a) of the Patents, &c. (Emergency) Act, 1939, the proviso to Section 91 (4) of the Patents and Designs Acts, 1907 to 1942, became operative on May 1, 1945.)

COMPLETE SPECIFICATION

Well Sinking Apparatus

I, PIERRE JEAN-MARIE THÉODORE ALLARD, a citizen of the French Republic, of 23, Avenue de Joinville, Chantilly (Oise), France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Sinking of the tubes used in boring is difficult due to friction of the soil. The present invention has for its object a device for facilitating such sinking by imparting to the tubes a rotary reciprocating motion and which comprises an operating lever hingedly connected at one end to a collar clamped to the tube to be sunk, while the other end thereof is reciprocated through an angle of less than 180° by means of a suitable mechanism. The operative lever is attached to the collar, by a hinged connection in order to accommodate downward movement of the tube with respect to the controlling mechanism. Further, the length of the lever is such as to keep the controlling mechanism away from the sinking tube and to increase the torque exerted on the tube by the control mechanism.

The controlling mechanism for the lever may consist for example of a screw threaded rod adapted to rotate alternately in both directions, or by a rod with double screw thread, a tackle-gearing, a piston operated hydraulically or by compressed air or by steam, or by any other suitable means.

In the accompanying drawings which show, by way of example several embodiments of the invention;

Figs. 1 and 2 are respectively plan and elevational views of an embodiment of the invention;

Fig. 3 shows at an enlarged scale the lever control mechanism;

Figs. 4 and 5 show another embodiment of the invention;

Fig. 6 diagrammatically shows a further embodiment of the invention;

Figs. 7 and 8 show a still further embodiment of the invention.

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In all embodiments hereinafter described, a control lever 25 is attached to the sinking tube, preferably by the device shown in Figs. 1 and 2, which comprises a collar 28 made fast to the tube and connected with one end of said lever by means of a hinge 27. This clamping collar 28, frictionally mounted on the upper element T of the sinking tube, is constituted by two halves pivotally connected at 29 and tightened together by a screw or bolt 30. The free end of the lever is reciprocated by a control mechanism which, in the embodiment shown in Figs. 1 to 3 consists of a screw threaded rod 1, adapted to rotate in both directions and on which is screwed a nut 22, provided with a pin 23 and a roller 24, the latter being adapted to slide within a slot 26 provided at the end of lever 25 remote from tube T. Rod 1, mounted in bearings 2 and 3 of a suitable structure, is driven alternately by pulleys 4, 5, adapted to rotate in opposite directions, by means of a clutch sleeve 9, adapted to slide on the end of threaded rod 1 (fig. 3) and carrying pins 10, 11 adapted to engage holes 12, 13 formed in said pulleys. Fork members 20, 21 are provided for automatically reversing the rotation when the nut 22 controlling lever 25 reaches either end of its stroke. A continuously rotating shaft 8 carries two pulleys 6, 7 made fast thereto and adapted to drive pulleys 5, 4 by means of an open belt 31 and crossed belt 31', respectively. Fork members 20, 21 are secured to a rod 17, slidably mounted in guides 18 and 19, and having at its end a finger 16, adapted to rock a lever 14 about a fulcrum 15, for controlling clutch 9.

When clutch 9 engages pulley 5 for example (fig. 3), threaded rod 1 is rotated on such a direction as to move nut 22 in the direction indicated by arrow F² thereby causing lever 25 and tube T to turn in the direction indicated by arrow F¹. Hinge 27 and slot 26 accommodate sinking movement of the tube in the direction indicated by arrow F⁴. At the end of the stroke of nut 22, this engages

fork member 20, thus operating the clutch mechanism 17, 14 to disconnect clutch 9 from pulley 5 and to connect said clutch with pulley 4. Nut 22 is, therefore, moved in the direction indicated by arrow F³ and causes the tube to turn in the opposite direction.

In the embodiment shown in Figs. 4 and 5, the control mechanism for lever 25 consists of a rod 1 having two screw threads of reverse pitches, united at their ends. The nut 22, which moves along the cylindrical body of said threaded rod, is herein provided with a pivotal screw-thread element 34 which takes automatically the inclination suitable for the direction of translation of the nut, which is thus reciprocated in a continuous manner as in Fig. 1.

Fig. 6 shows a controlling mechanism embodying a hydraulic piston 38 at the end of a rod 35, slidably guided in bearings 36, 37 and carrying roller 24 engaging the slot 26 of lever 25. Piston 38 is adapted to reciprocate in a cylinder 39 under the action of a liquid which is forced by a pump and distributor unit 40, alternately on each side of piston 38, through suitable pipes 41, 42. When lever 25 reaches one end of its stroke, the direction of rotation of the pump is reversed automatically or not, thus reversing the movement of piston 38 and lever 25. Piston 38 may as well be driven by compressed air or steam.

In the embodiment of Figs. 7 and 8, lever 25 is controlled by a tackle gearing comprising two sheaves 43, 44 mounted on both sides of the free end of lever 25 and cooperating with ropes 45 and 47, passing around sheaves 49, 48 located at the ends of a stationary frame 50, extending beyond the end positions of lever 25. Ropes 45, 47 engage guide-sheaves 51 and 52, and are finally wound upon a winch drum 46, which is adapted to rotate alternately in opposite direction. The opposite ends of the ropes are attached to fixed points 45^a, 47^a.

It will be seen that, when drum 46 is rotated so as to wind up rope 47, rope 45 is slackened and lever 25 is turned in the direction indicated by arrow F⁴. The winch movement is reversed under the action of suitable means at each end of the stroke of lever 25, which is thus recipro-

cated between its end positions A and B.

It will be understood that the invention is not limited to the particular embodiments described and shown, which have been selected only by way of example.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A device for sinking boring tubes which comprises an operating lever hingedly connected at one end to a collar clamped to the sinking tube, while the opposite end is connected to a mechanism for oscillating said lever by an angle less than 180°.

2. A device as claimed in claim 1, wherein said mechanism comprises a member having a rectilinear reciprocating motion suitably connected with the end of said lever.

3. A device as claimed in claim 2, wherein said lever is connected with said member by a slot and roller connection.

4. A device as claimed in claim 2, wherein said member consists of a screw-threaded nut engaging a screwthreaded rod adapted to rotate alternately in opposite directions.

5. A device as claimed in claim 2, wherein said member consists of a sleeve having an inner pivotal connection adapted to engage either of two helical grooves cut in a rod adapted to constantly rotate in the same direction, said grooves being of reverse pitches and merging into one another at both ends of the rod.

6. A device as claimed in claim 2, wherein said member is operatively connected with a fluid actuated piston.

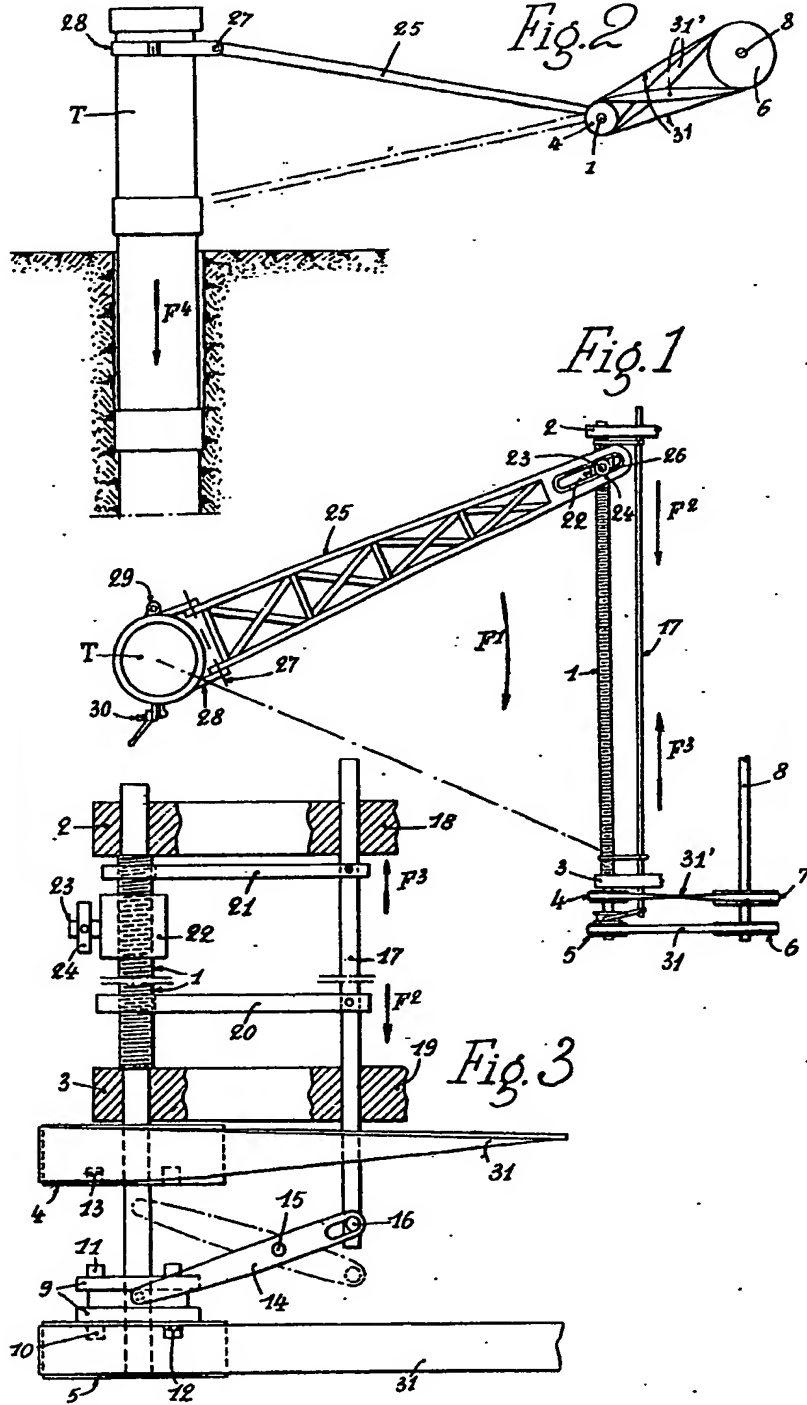
7. A device as claimed in claim 1, wherein said mechanism comprises two tackle connections on each side of the free end of said lever, and a common winch upon which the ends of the ropes are wound in opposite directions.

8. A device for sinking boring tubes substantially as described and as shown in the appended drawing.

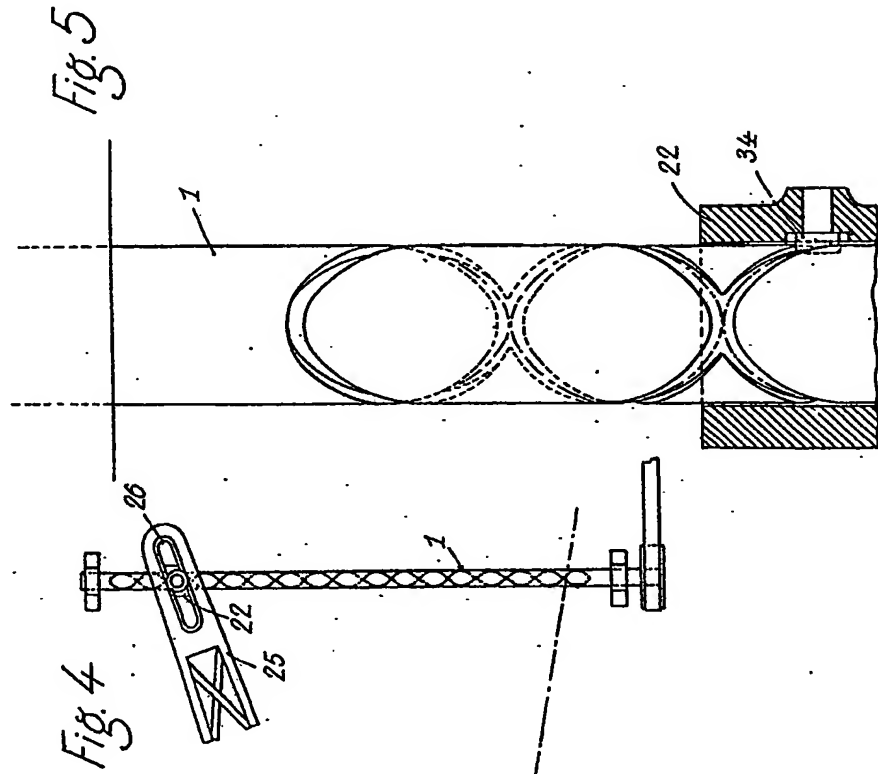
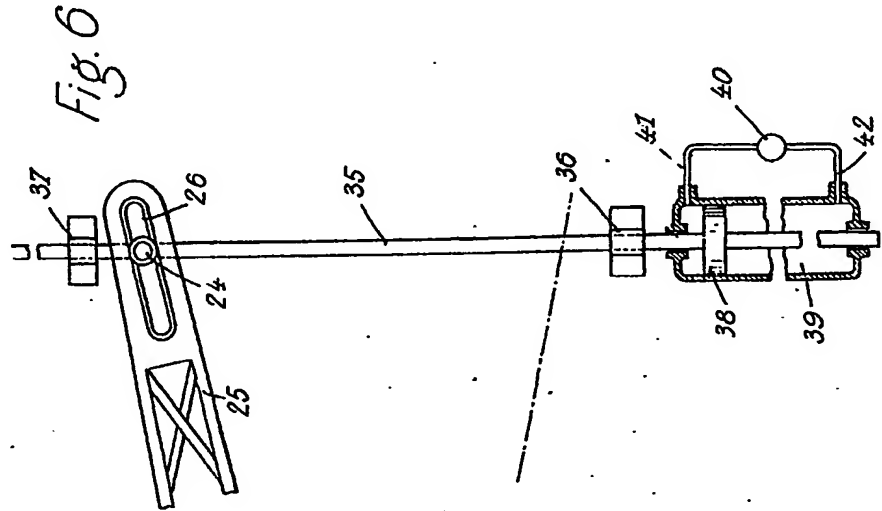
Dated this 1st day of May, 1945.

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29, Southampton Buildings,
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29, St. Vincent Place, Glasgow
Agents for the Applicant.

[This Drawing is a reproduction of the Original on a reduced scale.]



[This Drawing is a reproduction of the Original on a reduced scale.]



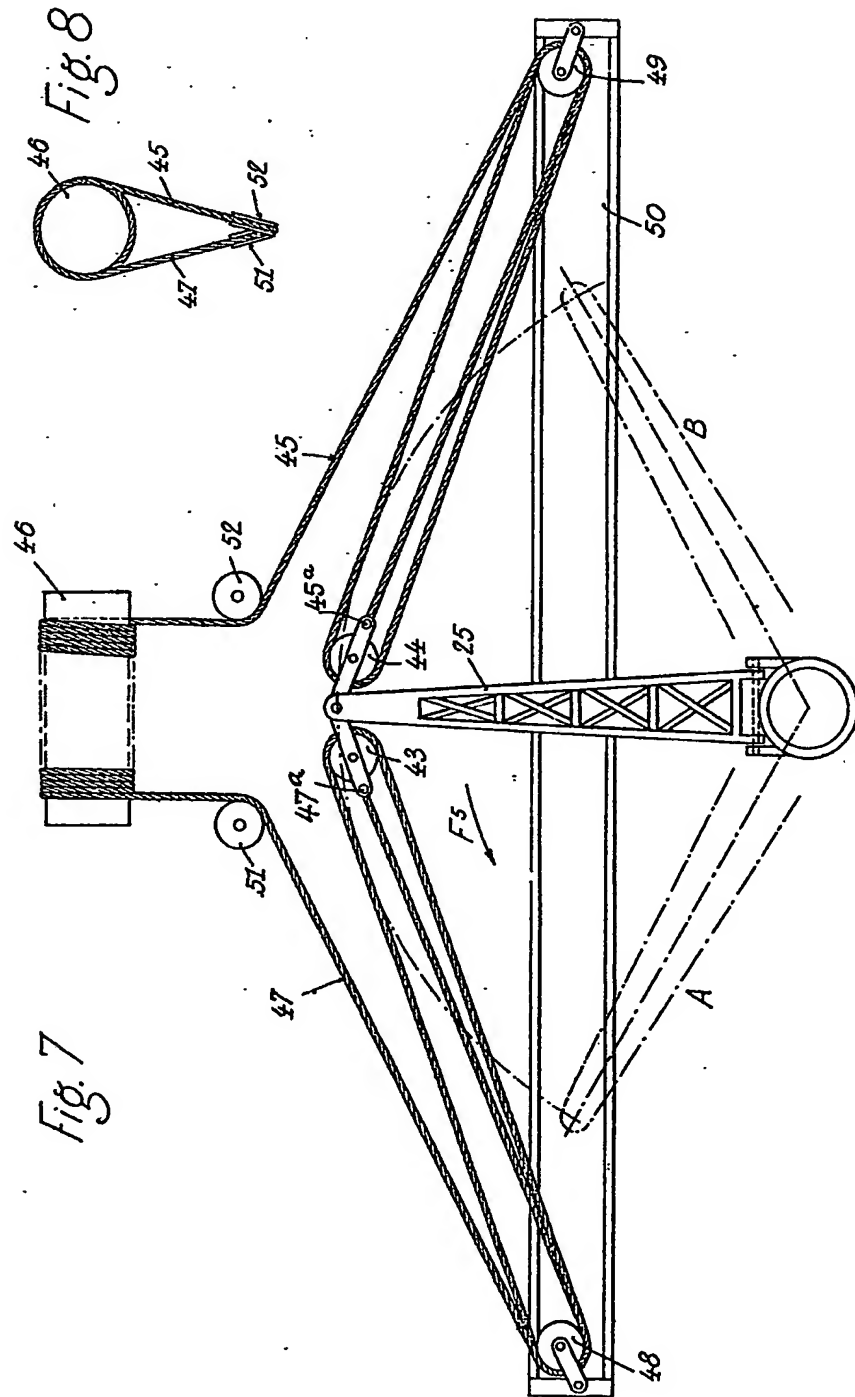


Fig. 8

Fig. 7

